

In re Application of

MILLS

Appl. No. 07/825, 845

Filed:

For: ENERGY/MATTER CONVERSION  
METHODS AND STRUCTURES

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The Hon. Commissioner of Patents  
and Trademarks  
Washington, DC 20231

Sir:

Sergci B.Nesterov, residing at 4-12 Remizova st. Moscow,  
Russia, 113186 declares and states that:

1.I received a Bachelor of Science degree in cryophysics  
engineering (physics and technology of low temperatures) , Moscow  
Power Engineering Institute ( MPEI), 1980.

2.In 1980-81 I worked as an engineer at Cryogenics Department  
MPEI, participating in development of elements of the thermal  
management of space crafts a) heat pipes; b) thermal radiator.

3. PhD degree in nuclear fusion products pumping, MPEI, 1985.  
Since 1989 I am an associate professor at MPEI Cryogenics  
Department.

4. In 1982-83 I participated in developing of systems of fusion  
reaction products pumping and regeneration.

5. I am currently the Head of MPEI Cryogenics Center and the senior manager responsible for creating a model of pumping block of nuclear fusion products for ITER project (International Thermonuclear Engineering Reactor).

My current work includes also development of technology for protective coverings, creation of highly effective systems for purification of sewage.

6. I am the author and co-author of numerous technical reports and papers, of which selected publications are shown in the attachment.

Alexei P.Kryukov, residing at 11/2-63  
Sadovaya-Chernogryazskaya st., Moscow, Russia 103064 declares and states that:

1. I received a Bachelor of Science degree in industrial heat power from MPEI in 1972.

2. I received a PhD degree in heat transfer, MPEI, 1977.

Postdoctorial - DSc(Eng) - MPEI, 1990 , Molecular Physics.

3. I am currently a Professor in Cryogenics Department, MPEI, and also a senior scientist in fundamental research of transport processes on the interphase gas-condensate.

4. In 1976-79 together with Professor Labuntsov (MPEI) we developed an approximate method of strong evaporation and

condensation analysis. Based on the principles of the molecular kinetic theory, simple formulae were suggested for engineering practice. These formulae are valid at subsonic vapour velocities. A comparison of the calculation results with the experimental data of Niknejad and Rose ( see: Niknejad J. and Rose J.W. in Proc.Royal Soc.London.1981 Vol.378.P.305-327; Kosasie A.K. and Rose in Proc. 7-th ASME National Heat Transfer Conference San-Diego, USA, 1992 ) on strong condensation of mercury showed a good agreement. In 1986 Pong L. and Moses G.A. generalized method used by Dr. Labuntsov and me to the problem of strong condensation in the presence of a noncondensable gas (see: Pong L. and Moses G.A. in Phys.Fluids. 1986.Vol.29.No.6P.1796- 1804).

In 1987 an accurate analysis of heat-mass transfer on vapour-liquid interphase at the reflection of sound wave on this surface was made by me and Dr.Labuntsov. It was shown that for liquid metal and superfluid helium the sound reflection coefficient was very small. As a result a large part of sound energy incoming to interphase was converted into heat on this surface.

In 1983-1991 I studied the processes of evaporation and condensation on the base of the Boltzmann equation solutions. Some theoretical results for supersonic condensation were confirmed by my own experimental data at cryogenic temperatures. ¶

5. My previous work includes research and development of cryovacuum means for helium and hydrogen isotopes pumping. I also studied processes of heat transfer in superfluid helium. As a co-author of Steve Van Sciver (USA) I theoretically received a value of the recovery heat flux from boiling in superfluid helium

6. I am the author and co-author of numerous scientific papers and technical reports, of which selected publications are shown in the attachment.

Sergei B.Nesterov and Alexei P.Kryukov together declare and state that:

1. We have reviewed and understand the concept covered by the subject U.S. application No.07/825,845 of Dr.Randell L.Mills and we are personally familiar with the methods and apparatus disclosed therein.

2. We ( hereinafter MPEI ) have conducted independent experiments on nominally identical apparatus to that made by Dr. Randell Mills ( hereinafter HPC ) to check HPC's method and results, since July of 1992.

3. MPEI's experiments show 0.75 watts of heat output with only 0.3 watts of heat input. Excess energy on the order of 0.45 watts has been produced reliably and continuously over the last three months. Scintillation counter measurements show no signs of radiation external to the cell.

#### DESCRIPTION OF THE MPEI CELL

The MPEI experimental cells were assembled comprising a 1000 ml silvered vacuum jacketed dewar with a 10 cm opening. The cathode was a 7.5 cm wide by 5 cm long by 0.125 mm thick nickel foil (Aldrich 99.9 %, cold roll, clean Ni ) spiral of 9 mm diameter

by tightly rolling the nickel foil about the rod. The rod was removed. The leads were inserted into glass tubes to insure that no recombination of the evolving gases occurred. The anode was a platinized titanium ( Engelhard Pt/Ti mesh 2 by 2 inches ) covered with 100  $\mu$  platinum series 3000 ). The cathode and anode cables were connected to terminals bolted to the cell lid. The lid was made of resin glass. A foam plastic disk was set under the lid to lesson heat losses. The disk was 1 cm thick covered by film foil. See Figure 1.

Before assembly, the anode array was cleaned in 3 M HCl for 5 minutes and rinsed with distilled water. The cathode was rinsed with distilled water.

The electrolyte solution comprised 1 liter of 0.57 M K<sub>2</sub>CO<sub>3</sub> (Alfa K<sub>2</sub>CO<sub>3</sub> 98% ).

The heater comprised a 6.6 ohm Nichrome wire. It was inserted into the glass jacket and suspended with Teflon covered leads.

It was powered by an Invar constant power ( $\pm 0.1\%$ ) supply (Model B-5-49). The heater resistance was measured by means of calibration resistor. The current ( $\pm 0.1\%$ ) was recorded with ampermeter M 903. The electrolysis current ( $\pm 0.1\%$ ) was measured by ampermeter M 903.

The temperature ( $\pm 0.1^\circ\text{C}$ ) was recorded with a microcomputer thermometer (MPEI). To provide temperature control copper constantan thermocouples were used.

The temperature ( $\Delta T = T$  (electrolysis only) -  $T$  (ambient)) and the electrolysis power were recorded regularly. The heating coefficient was determined "on the fly" by the addition of heater power at 72 hour increments where 24 hours were allowed for steady state to be achieved. The temperature  $\Delta T_2 = T$  (electrolysis + heater) -  $T$  (ambient) was recorded as well as the electrolysis power. The ambient temperature was measured from a

blank cell that comprised a closed 1 liter silvered vacuum jacketed dewar containing 1 liter of H<sub>2</sub>O placed near the electrolysis cell.

The electrolyte solution was stirred by a 0.7 cm open prolate spheroid magnetic stirring bar which was spun by a mixing motor made in Czechoslovakia.

Figure 2 shows the electrolysis cell on test.

## RESULTS

A heat balance of the cell is shown in Figure 3; some of MTEI results are shown in Table 1. From Table 1 it is clear that by growth of electrolyte temperature due to the increase of load of the additional heater electrolysis current grows at constant voltage of 3 V. Calculation method for 0.45 watts of excess power is represented graphically in Figure 4.

The theory that led to the discovery of this electrolytic process was developed by Dr. Randell Mills, HPC, Lancaster, Pennsylvania. This theory is covered by a patent application entitled "Energy/Matter Conversion Methods and Structure", and is described in the Fusion Technology article "Excess Heat Production by the Electrolysis of an Aqueous Potassium Carbonate Electrolyte and the Implications for Cold Fusion" by Dr. Mills and S. Kncizys, the article entitled "A Unified Theory Derived from First Principles" (submitted to the Physical Review for publication by Dr. Mills and W. Good), the article entitled "Two Electron Atoms and Elastic Electron Scattering by Helium" (submitted to Physical Review for publication by Dr. Mills) and the books entitled "The Grand Unified Theory", by Dr. Mills and Dr. J. Farrell, "Unification of spacetime, the forces, matter and energy" by R. Mills.

Under the MTEI theory the predominant source of heat is believed to be an electrocatalytically induced reaction whereby hydrogen atoms undergo transitions to quantized energy levels of lower energy than the conventional "ground state". These lower energy states correspond to fractional quantum numbers. The hydrogen electronic transition requires the presence of an energy hole of approximately 27.2 eV provided by electrocatalytic reactant(s) (such as  $Pd^{2+}/Li^+$ ,  $Ti^{2+}$ , or  $K^+/K^+$ ), and results in "shrunken atoms" analogous to muonic atoms. Calorimetry of continuous electrolysis of aqueous potassium carbonate ( $K^+/K^+$  electrocatalytic couple) at a nickel cathode was performed in the calorimetry cells. Total power out exceeded total input power by a factor of 2.5 as described, above.

MTEI tests results are summarized as follows:

1. Evaluation of the electrolyte after three months operation shows no significant change in its density and molar concentration.
2. The cell was disassembled and inspected after over one month of operation at 0.1 amper. This inspection showed no visible signs of a reaction between the electrodes and electrolyte. The cell was re-assembled and is operating as before, producing excess heat for three months.
3. Measurements of neutrons were not considered necessary since light water is used in place of deuterium. A scintillation counter was placed next to the cell. No radiation levels above background were detected indicating that nuclear reactions are not involved.
4. Water makeup rates match the Faraday usage plus evaporation.

We declare further that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements

and the like made are punishable by fine or imprisonment, or both, under Section 1001 or Title 18 of the United States Code and that such willful false statements may jeopardize validity of the application or any patent issuing thereon.

Figure 1. CELL ASSEMBLY

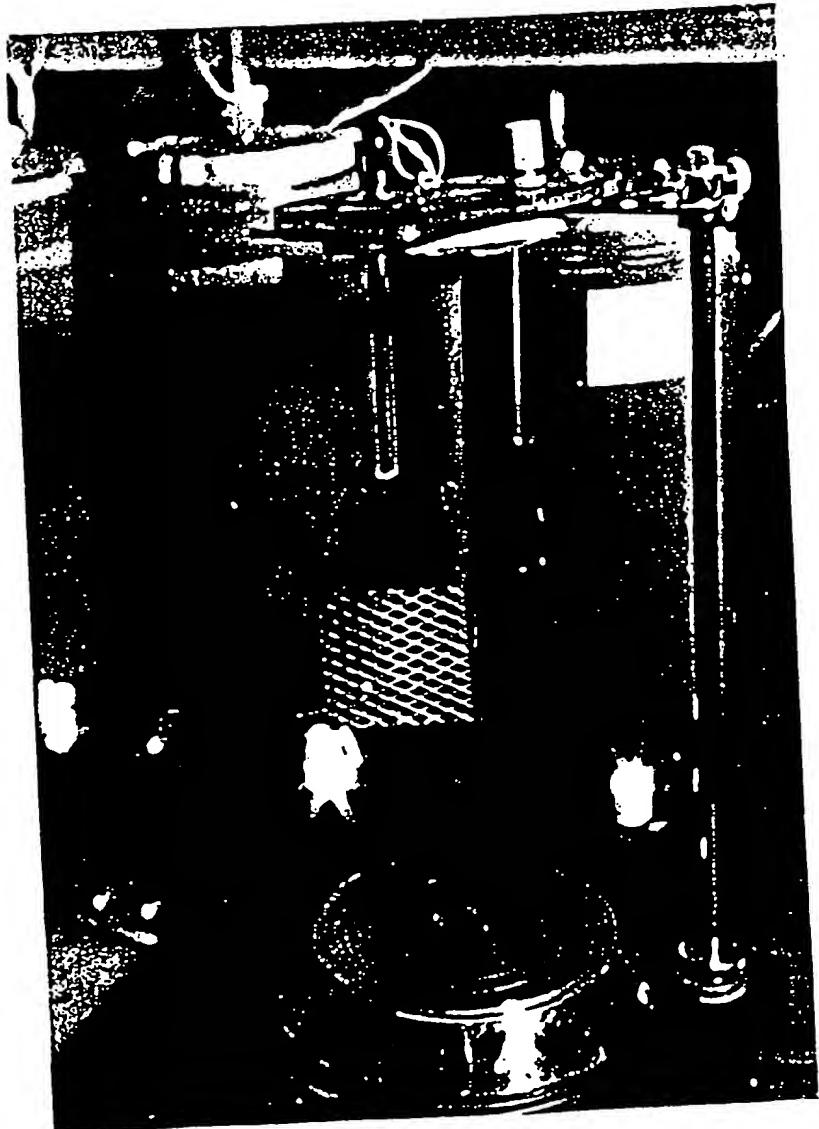


Figure 2. ELECTROLYTIC CELLS ON TEST

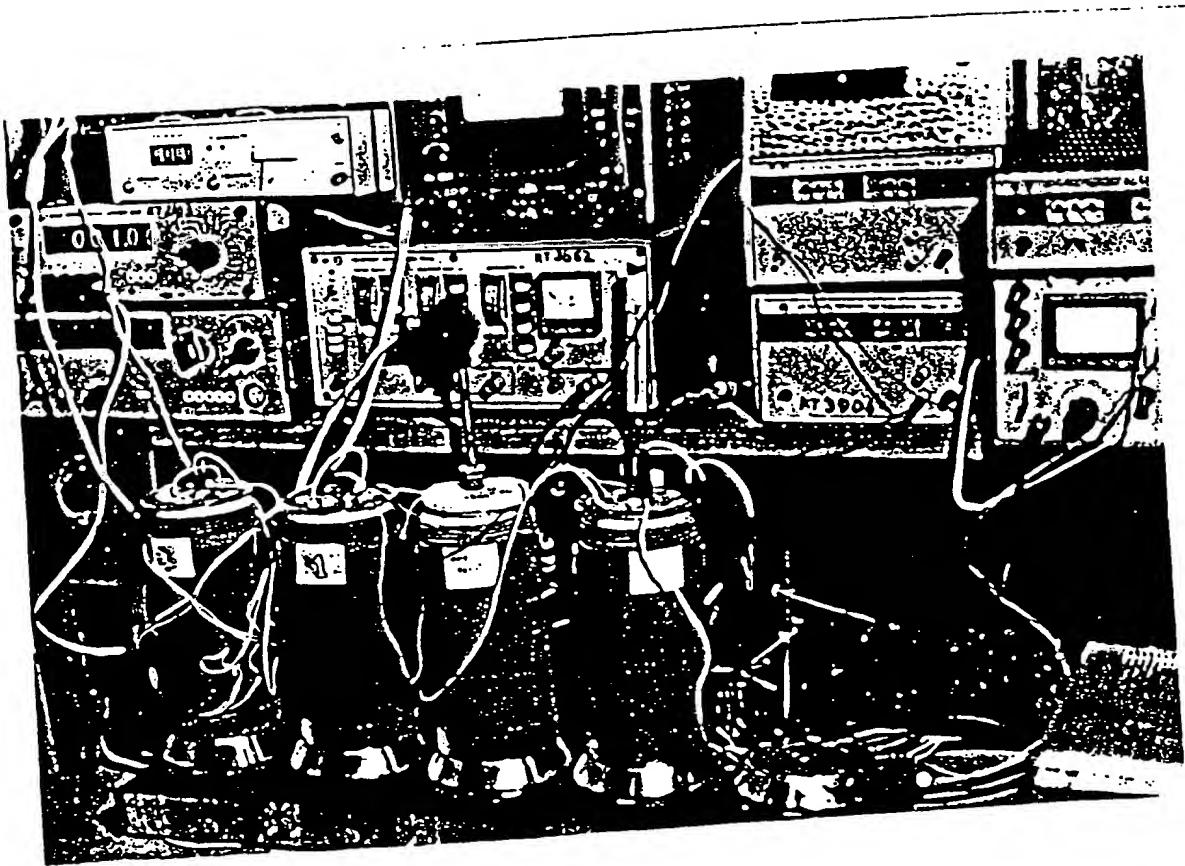
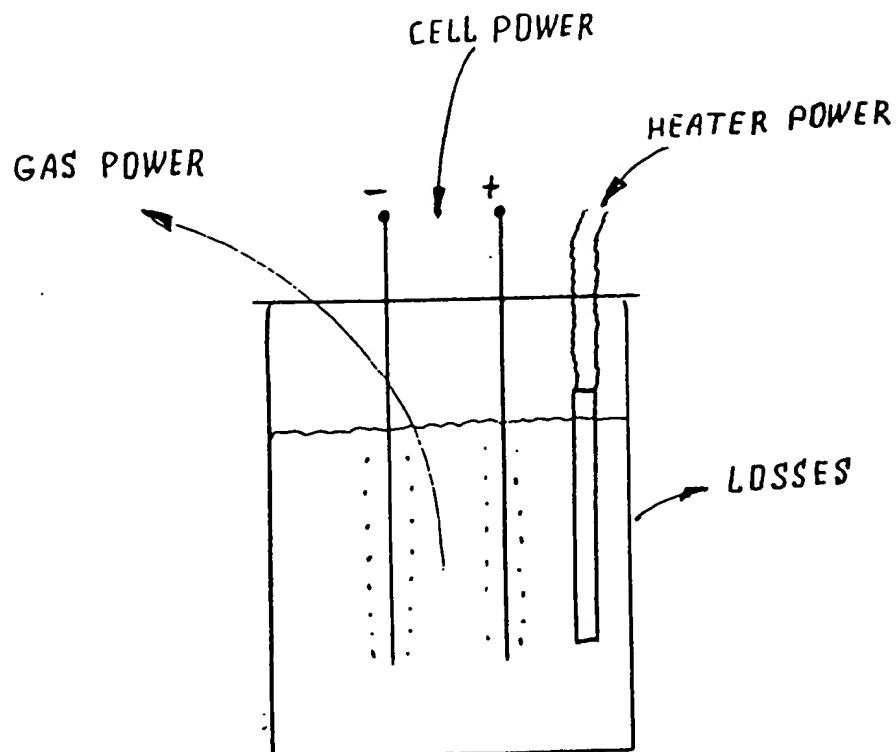


Figure 3. CELL HEAT BALANCE



$$\text{cell power} = VI$$

$$\text{gas power} = 1.48 I$$

$$\text{ohmic power} = (V - 1.48) I$$

$$\text{heater power} = V_H I_H$$

LOSSES - measured incrementally

Figure 4. METHOD FOR CALCULATING  
EXCESS POWER

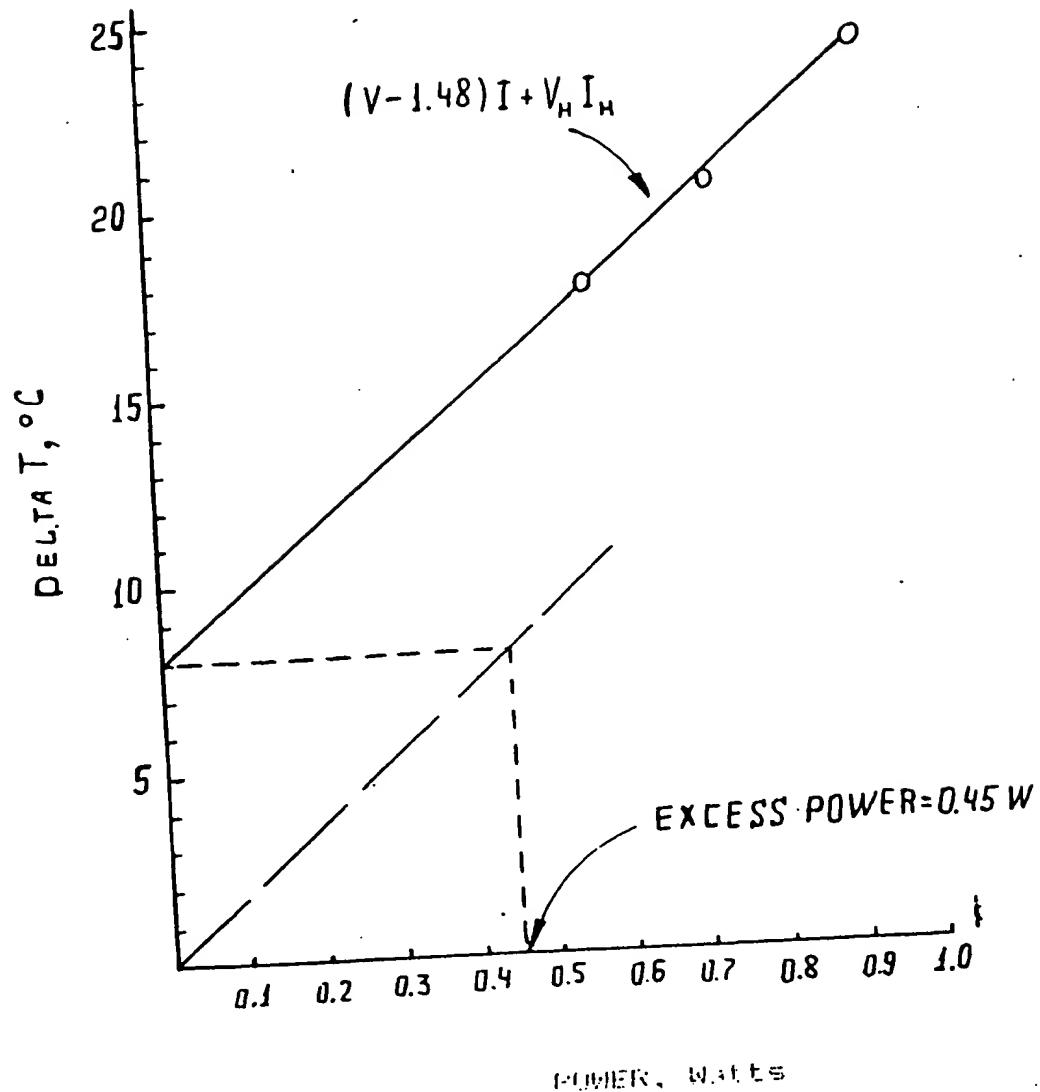


TABLE 1. Summary of MPEI Test Results

Input Conditions			Output Conditions				Output Input
V (Volts)	A (Amps)	Total Input Power=VI (Watts)	Total Output Power (Watts)	Subcomponents (Watts)			
				Gas 1.48I	Excess	Ohmic Heating = (V-1.48)I	
3.00	0.100	0.300	0.750	0.148	0.450	0.152	2.50
3.00	0.107	0.321	0.771	0.158	0.450	0.163	2.40
3.00	0.121	0.363	0.813	0.179	0.450	0.184	2.24

ATTACHMENT

Sergei B.Nesterov  
Head of MPEI Cryogenics Center

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Kryukov A.P.  
Professor of MPEI Cryogenics Department

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By: S.B.Nesterov

Sergei B.Nesterov

Date: 2/26/93

By: A.P.Kryukov

Alexei P.Kryukov

Date: 2/26/93

USA EMBASSY, MOSCOW

On this, the 26th day of February, 1993, before me, a notary public, the undersigned officer, personally appeared Sergei B.Nesterov and Alexei P.Kryukov, known to me (or satisfactorily proven) to be the persons whose names are subscribed to the within instrument, and acknowledged that they executed the same for the purposes therein contained.

In witness whereof, I hereunto set my hand and official seal.



Notary Public

**THOMAS J. HUSHEK**  
Vice Consul of the United  
States of America

Russian Federation .....  
Moscow Oblast .....  
City of Moscow .....  
Embassy of the United States of America  
Consular Section .....